Effectiveness of 3D vs. 2D in vitro Well Treatments

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Despite increased research and treatment options, cancer continues to increase. To test treatments for this deadly disease, 2D microenvironments are currently used in lab settings. Only 10% of treatments that work in 2D cultures are effective in the human body. To more closely mimic the environment of the human body, 3D microenvironments may be utilized in place of 2D cultures. This was tested by growing Michigan Cancer Foundation-7 (MCF-7) cells in a 2D and 3D microenvironment, then treating both with Tamoxifen. Magnetic levitation was used to create the 3D tumors. To accomplish this, a magnetic driver was assembled to fit a 24-well plate. Next, MCF-7 cells were grown to 80% confluence and plated in two 24-well plates. Groups 1 and 2 contained nanoparticles and were levitated by placing the magnetic driver on top of the well plate. After levitation, Groups 1 and 3 were treated with 1x10-4 dilution of Tamoxifen. Groups 2 and 4 were treated with 1x10-6. An MTT assay was run and two t-Tests were conducted to determine statistical significance. At a lower dilution the number of cell killed by Tamoxifen when in a 2D microenvironment was statistically significant when compared to the number of cells killed in a 3D microenvironment. This may indicate that monolayers receive treatment to each exposed cell, while in tumors only surface cells receive direct treatment. The higher dilution of Tamoxifen was not statistically significant.

Awards Won:
Fourth Award of $500